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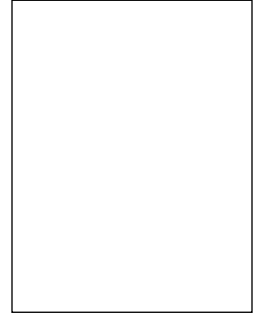
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## Description of Soil Evolution in Southern Mashhad City using Jenny's, and Johnson and Watson-Stegner's Conceptual Models

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### ABSTRACT

Conceptual models are suitable for describing the internal relationships of complex systems, such as soil. In this study, we used the conceptual models of Jenny, and Johnson and Watson-Stegner to understand the formation and evolution of soil. We studied 20 pedons in granitic hilly lands, loessial piedmont in granitic hilly lands, and piedmont plain in southern Mashhad, northeast Iran. These soils are characterized by high levels of gypsum, especially in the granitic saprolites, which suggest the importance of the wind in shaping the soil structure. Jenny's model is a developmental and equilibrium model, which only describes the state of the soil formation factors and it considers that each bioclimatic zone has a specific climax soil. This model focuses on the genesis of the surface soil and is not suitable for buried soils and paleosols. According to Johnson and Watson-Stegner's model, soil is a product of progressive and regressive processes due to horizonation or haploidization. Progressive processes during the last interglacial cycle created a well-developed paleosol where an argillic horizon developed in all of the landforms, except in the piedmont plain. Simultaneously, developmental soil up-building by aeolian addition led to gypsum enrichment of the granitic saprolite. Erosion decreased the soil thickness and exposed the argillic horizon. The Last Glacial Maximum led to the greater deposition of loess, which covered the paleosol. During the early Holocene, the climate in the region was more humid than it is today, thereby leading to the development of a Bk horizon. This horizon has been preserved in the stable surfaces of the granitic hilly lands and in the loessial piedmont, but it has been buried on the piedmont plain via the deposition of alluvial sediments. Jenny's model can be used to make judgments about soils based on current soil formation factors, whereas Johnson and Watson-Stegner's model is a two-pathway evolutionary model that for any interpretation, it requires the morphological characteristics of pedons.

**Key Words:** landscape evolution, progressive pedogenesis, regressive pedogenesis, soil formation model

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